

# Tyler Waterman

Assistant Professor ▪ Union College ▪ Civil and Environmental Engineering  
watermat@union.edu ▪ [tswater.github.io](https://github.com/tswater) ▪ [Google Scholar](#)

## Education

### Duke University

PhD in Civil and Environmental Engineering 05/2024

- Thesis: *Representing the Heterogeneity of Land-Atmosphere Interactions in Earth System Models*

### University of California Berkeley

B.S in Civil and Environmental Engineering 05/2019

- 2018 Honors Research Thesis: *Developing a Framework for Modern Modeling of Interception Loss in Forest Canopies* advised by Dr. Sally Thompson
- 2017 Honors Research Thesis: *Development of Efficient CRISPR-Cas9 Genome Editing in *Desulfovibrio vulgaris* Hildenborough (DvH) for Studying Anaerobic Microbial Functions and Interactions*

---

## Academic Interests

Earth systems science, land-atmosphere interactions, spatial data, environmental engineering, earth system model development, hydrometeorology, natural hazards, boundary layer meteorology, spatial heterogeneity, hydrology, large eddy simulation, remote sensing, pedagogy in earth systems science

---

## Research Appointments

### Union College: Waterman Lab

Assistant Professor in Environmental Engineering (August 2026 – present)

### University of Utah: Dr. Marc Calaf

NSF Postdoctoral Fellow (July 2024 – July 2026)

Developing novel parameterizations of turbulent exchange between the land and atmosphere using a large, flux tower network (NEON) and implementing those parameterizations within an Earth System Model (CESM)

### Duke University: Dr. Nathaniel Chaney Hydrology Lab

Research Assistant (August 2019 – May 2024)

Leveraged large datasets (NEON, satellite, etc.), as well as coarse and high resolution modeling, to understand heterogeneity and land-atmosphere interactions and develop novel, heterogeneity-aware parameterizations for improved weather, climate and natural hazards modeling

### University of California Berkeley: Dr. Sally Thompson Ecohydrology Lab

Undergraduate Researcher (May 2018 – January 2019)

Participated in field work in fire ecology and hydrology while developing a model of canopy rain interception

---

# Teaching Experience and Professional Development

## University of Utah Mechanical Engineering

NSF STEM Ambassador Program Fellow (Fall 2025)

- Participated in 15 hours of training and workshops on community outreach and science communication
- Developed an [interactive climate and weather modeling activity for K-12 students](#) in state custody

## Duke Civil and Environmental Engineering

Environmental Spatial Data Analysis – Teaching Assistant (Fall 2021)

- Taught and helped develop materials for a series of course lectures
- Codeveloped course assignments with instructor, graded them, and answered student questions
- Anonymous Feedback: “Tyler was an *Integral part of my learning*” (download [full evaluations here](#))

Fluid Mechanics – Teaching Assistant (Fall 2022)

- Led undergraduate lab sessions and experiments on fluids topics, held office hours and graded coursework
- Anonymous Feedback: “Tyler teaches for learning and understanding rather than assignment completion. In office hours he would challenge me to fully understanding the background knowledge, concepts and applications of the questions” ([download full evaluations here](#))

Certificate in College Teaching (Fall 2021 - Spring 2024)

- Took three courses in pedagogy and curriculum development, culminating in developing a hydrology course
- Participated in peer evaluation of teaching techniques with other Duke educators

Preparing Future Faculty (Fall 2022 - Spring 2023)

- Developed a mentor relationship with a professor at another university to discuss teaching, scholarship
- Visited faculty at multiple teaching focused institutions across North Carolina to learn about teaching and scholarship in the context of undergraduate focused institutions

## Berkeley Civil and Environmental Engineering

International Water Development DeCal – Student Instructor (Spring 2018)

- Established and created the curriculum for a lower division Berkeley undergraduate course on water systems in infrastructure poor regions
- Taught basic computer aided design and principles of water development, water systems, social implications of water, community engagement, and the design process to Berkeley undergraduate students

---

## Honors, Grants and Awards

- 2024 NSF-AGS Postdoctoral Fellowship “Extending the Applicability of Monin-Obukhov Similarity Theory-based Surface Layer Parameterizations to Complex Surfaces in Earth System Models” (\$200,000)
- 2024 GEWEX OSC Early Career Support (\$2000)
- 2022 Preparing Future Faculty Fellow (\$500)
- 2022 Duke Professional Development Fund (\$250)
- 2020 NSF Graduate Research Fellowship Program – Honorable Mention
- 2019 Pratt Gardner Fellowship (\$10,000)
- 2018 Slotman Award for Excellence in New Student Services
- 2015 Croul Family Scholarship (\$4,000)

---

## Publications

**Waterman, T.**, Germ, P., Calaf, M., Pardyjak, E., Chaney, N. (2026) A Satellite Remote Sensing and Doppler LiDAR-based Framework for Evaluating Mesoscale Flows Driven by Surface Heterogeneity. Preprint on arxiv: <https://doi.org/10.48550/arXiv.2511.05429>

**Waterman, T.**, Stiperski, I., Torres-Rojas, L., Calaf, M. (2026). Impact of heterogeneity on scalar flux variance relations across diverse ecosystems. *Agricultural and Forest Meteorology*, 384, 111167  
<https://doi.org/10.1016/j.agrformet.2026.111167>

**Waterman, T.**, Stiperski, I., Chaney, N., Calaf, M. (2026). Evaluating anisotropy-based Monin–Obukhov similarity theory over canopies and complex terrain. *Quarterly Journal of the Royal Meteorological Society*, e70206 <https://doi.org/10.1002/qj.70206>

**Waterman, T.**, Dirmeyer, P., and Chaney, N., (2025) Surface Flux Homogenization and Its Impacts on Convection across CONUS. *J. Hydrometeor.*, 26, 709–724, <https://doi.org/10.1175/JHM-D-24-0098.1>.

**Waterman, T.**, Bragg, A., Hay-Chapman, F. et. al. (2024) A Two-Column Model Parameterization for Subgrid Surface Heterogeneity Driven Circulations. *Journal of Advances in Modelling Earth Systems*. 16, e2023MS003936 <https://doi.org/10.1029/2023MS003936>

**Waterman, T.**, Bragg, A., Katul, G., Chaney, N. (2022) Examining Parameterizations of Potential Temperature Variance Across Varied Landscapes for use in Earth System Models. *Journal of Geophysical Research: Atmospheres*, 127, <https://doi.org/10.1029/2021JD036236>

Fowler, M., Neale, R., **Waterman, T.**, et. al (2024) Assessing the Atmospheric Response to Subgrid Surface Heterogeneity in the Single-column Community Earth System Model, version 2 (CESM2). *Journal of Advances in Modelling Earth Systems*, 16(3). <https://doi.org/10.1029/2022MS003517>

Torres Rojas, L., **Waterman, T.**, Cai, J., Zorzetto, E. Wainwright, H., Chaney, N. (2024) A geostatistics-based tool to characterize spatio-temporal patterns of remotely sensed land surface temperature fields over the Contiguous United States. *Journal of Geophysical Research: Atmospheres*, 129.

<https://doi.org/10.1029/2023JD040679>

Bacelar, L., Torres Rojas, L., Vergopalan, N., **Waterman, T.**, Chaney, N. Leveraging clustering to enable locally relevant and computationally efficient runoff predictions. Revision *Journal of Hydrology*. Preprint:

<http://dx.doi.org/10.2139/ssrn.4737923>

Lau, R., Seguí, C. **Waterman, T.**, Chaney, N., Veveakis, M. (2024) InSAR-Informed In-Situ Monitoring for Deep-Seated Landslides: Insights from El Forn (Andorra). *Journal for Remote Sensing and the Environment*, 24.

Preprint: <https://doi.org/10.5194/nhess-24-3651-2024>

---

## Talks, Posters and Presentations

**Waterman, T.**, “Extending Generalized Surface Layer Scaling to Diverse, Complex Terrain and Canopies for Improved Land-Atmosphere Exchange” Invited Talk, Innsbruck, Austria, 2025

**Waterman, T.**, Stiperski, I., Calaf, M. “Extending Generalized Surface Layer Scaling to Diverse, Complex Terrain and Canopies for Improved Land-Atmosphere Exchange” European Geophysical Union, Talk, Vienna, Austria, 2025

**Waterman, T.**, Stiperski, I., Chaney, N., Calaf, M. “Extending Applicability of Monin-Obkuhov Similarity Theory (MOST) Across Heterogeneous Ecosystems for Improved Land-Atmosphere Exchange” American Meteorological Society Annual Meeting, Talk, New Orleans, 2025

**Waterman, T.**, Dirmeyer, P., Chaney, N. “Evaluating the Impact of Surface Flux Homogenization in Land-Atmosphere Interactions” American Meteorological Society Annual Meeting, Talk, New Orleans, 2025

**Waterman, T.**, “Impact of Scale Disparity in Land-Atmospheric Coupling on Continental Precipitation Patterns” NOAA Precipitation Prediction Grand Challenge Research and Applications Workshop, Invited Talk, College Park, MD, 2024

**Waterman, T.**, Stiperski, I., Chaney, N., Calaf, M. “Extending Applicability of Monin-Obkuhov Similarity Theory (MOST) Across Heterogeneous Ecosystems for Surface Layer Parameterizations in ESMs” American Geophysical Union Fall Meeting, Talk, 2024

**Waterman, T.** Dirmeyer, P., Chaney, N. “Evaluating the Impact of Kilometer-Scale Surface Heterogeneity on Mesoscale Atmospheric Dynamics” GEWEX Open Science Conference, Talk, Sapporo, Japan, 2024

**Waterman, T.**, Bragg, A., Hay-Chapman, F., Dirmeyer, P., Fowler, M., Chaney, N. “Parameterizing the Large Scale Impact of Land Surface Heterogeneity Induced Circulations on Convective Cloud Development” European Geophysical Union General Assembly, Talk, Vienna, Austria, 2023

**Waterman, T.**, Bragg, A., Hay-Chapman, F., Dirmeyer, P., Fowler, M., Chaney, N. “Parameterizing the Large Scale Impact of Land Surface Heterogeneity Induced Circulations on Convective Cloud Development” National Center for Atmospheric Research Climate and Global Dynamics, [Invited Talk](#), Boulder, CO, 2023

**Waterman, T.** Bragg, A., Hay-Chapman, F., Dirmeyer, P., Fowler, M., Chaney, N. “A Two Column Model for Parameterizing Heterogeneity-Driven Sub-Grid Circulations” Coupling of Land and Atmospheric Sub-grid Parameterizations (CLASP) Project Meeting Princeton GFDL. [Invited Talk](#)\* (assisted with organization after invitation) Princeton, NJ, 2023

**Waterman, T.** Bragg, A., Chaney, N. “Modeling the Impact of Sub-Grid Land Surface Heterogeneity on Convective Cloud Development in Earth System Models” American Meteorological Society 103rd Annual Meeting, Poster, Denver, 2023

**Waterman, T.** Bragg, A., Chaney, N. “Modeling the Impact of Sub-Grid Land Surface Heterogeneity on Convective Cloud Development in Earth System Models” American Geophysical Union Fall Meeting, Poster, Chicago, 2022

**Waterman, T.**, Chaney, N. “A Multi-Column Approach to Resolving Heterogeneity Induced Secondary Circulations” European Geophysical Union General Assembly, Talk, Remote, 2022

**Waterman, T.**, Laura, T., Chaney, N. “Exploring How Heterogeneities in Land Surface Temperature Drive the ‘Missing Flux’” Frontiers in Hydrology Meeting, Poster, 2022

**Waterman, T.**, Chaney, N. “Capturing the Effects of Surface Flux Heterogeneity on the Lower Sub-grid Atmosphere in Earth System Models with a Multi-Column Approach” American Geophysical Union Fall Meeting, Poster, 2021

**Waterman, T.**, Chaney, N. “A Multi-Column Approach to Resolving Heterogeneity Induced Secondary Circulations” Coupling of Land and Atmospheric Sub-grid Parameterizations (CLASP) Fall Project Meeting, Talk, Remote, 2021

**Waterman, T.**, Chaney, N. “Evaluating and Improving Parameterizations of the Variance of Temperature Fluctuations Over Heterogeneous Landscapes for Surface Boundary Conditions in Atmospheric Models”, European Geophysical Union General Assembly, Talk, Remote, 2021

**Waterman, T.**, Chaney, N. “Improving Higher Order Surface Turbulence Statistics for CLUBB”, Coupling of Land and Atmospheric Sub-grid Parameterizations (CLASP) Fall Project Meeting, [Invited Talk](#), Remote, 2020

---

## **Leadership, Outreach Mentoring and Service**

### **STEM Community Alliance Program (STEMCAP)**

NSF STEM Ambassador (Fall 2025 – Spring 2026 )

- Developed an interactive teaching experience on climate and weather for K-12 students in state custody

### **Student Mentoring and Advising**

- Duke University: Sarah Bailey (Thesis),
- University of Utah: Giulia Salmaso (PhD), Ben Udina (PhD), Zane Frey (Masters/PhD)

### **National Ecological Observation Network (NEON) Advisor**

Surface-Atmosphere Exchange Technical Working Group Member (January 2025 – )

### **Duke Hydrology and Fluid Dynamics (HFD) Seminar**

Founder and Organizer (January 2022 –December 2023)

- Facilitating a biweekly space for students and postdocs in the HFD program to practice talks

### **Peer Reviewer**

Quarterly Journal of the Royal Meteorological Society, Geoscientific Model Development, J. of the European Meteorological Society, J. of Advances in Modeling Earth Systems, JGR: Atmospheres

### **Engineers Without Borders (EWB) UC Berkeley Chapter**

Chapter Education Director (November 2017 – November 2018)

- Established an educational curriculum for new members of the chapter, teaching technical and soft skills

Chapter Vice President (May 2017 – January 2018)

- Organized and coordinated chapter meetings and project managers,

Project Manager (May 2016 – May 2017)

- Managed a 1500-person water project for a developing community including finances, design, planning, construction scheduling, and coordination between 30+ members and professional contacts

### **UC Berkeley New Student Orientation**

Orientation Mentor (December 2016 – May 2019)

- Organized events and trained orientation leaders to welcome new students
- Facilitated and helped train orientation leaders to facilitate training for students covering implicit bias and awareness of socio-economic barriers in universities among other related topic

---

## **Memberships**

American Geophysical Union (2019 – present)

Member Society of Duke Fellows (2019 – 2024)

American Meteorological Society (2022 – present)

Member UC Berkeley Chi Epsilon Civil Engineering Honors Society (2016 – 2019)